Camurati-Engelmann disease

Camurati-Engelmann disease is a condition that mainly affects the bones. People with this disease have increased bone density, particularly affecting the long bones of the arms and legs. In some cases, the skull and hip bones are also affected. The thickened bones can lead to pain in the arms and legs, a waddling walk, muscle weakness, and extreme tiredness. An increase in the density of the skull results in increased pressure on the brain and can cause a variety of neurological problems, including headaches, hearing loss, vision problems, dizziness (vertigo), ringing in the ears (tinnitus), and facial paralysis. The added pressure that thickened bones put on the muscular and skeletal systems can cause abnormal curvature of the spine (scoliosis), joint deformities (contractures), knock knees, and flat feet (pes planus). Other features of Camurati-Engelmann disease include abnormally long limbs in proportion to height, a decrease in muscle mass and body fat, and delayed puberty.

The age at which affected individuals first experience symptoms varies greatly; however, most people with this condition develop pain or weakness by adolescence. In some instances, people have the gene mutation that causes Camurati-Engelmann disease but never develop the characteristic features of this condition.

Frequency

The prevalence of Camurati-Engelmann disease is unknown. Approximately 200 cases have been reported worldwide.

Genetic Changes

Mutations in the *TGFB1* gene cause Camurati-Engelmann disease. The *TGFB1* gene provides instructions for producing a protein called transforming growth factor beta-1 (TGFβ-1). The TGFβ-1 protein helps control the growth and division (proliferation) of cells, the process by which cells mature to carry out specific functions (differentiation), cell movement (motility), and the self-destruction of cells (apoptosis). The TGFβ-1 protein is found throughout the body and plays a role in development before birth, the formation of blood vessels, the regulation of muscle tissue and body fat development, wound healing, and immune system function. TGFβ-1 is particularly abundant in tissues that make up the skeleton, where it helps regulate bone growth, and in the intricate lattice that forms in the spaces between cells (the extracellular matrix).

Within cells, the TGFβ-1 protein is turned off (inactive) until it receives a chemical signal to become active. The *TGFB1* gene mutations that cause Camurati-Engelmann disease

result in the production of a TGFβ-1 protein that is always turned on (active). Overactive TGFβ-1 proteins lead to increased bone density and decreased body fat and muscle tissue, contributing to the signs and symptoms of Camurati-Engelmann disease.

Some individuals with Camurati-Engelmann disease do not have identified mutations in the *TGFB1* gene. In these cases, the cause of the condition is unknown.

Inheritance Pattern

This condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

Other Names for This Condition

- Camurati-Engelmann Syndrome
- CED
- diaphyseal dysplasia
- diaphyseal hyperostosis
- Engelmann's Disease
- PDD

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Diaphyseal dysplasia
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0011989/

Other Diagnosis and Management Resources

- GeneReview: Camurati-Engelmann Disease
  https://www.ncbi.nlm.nih.gov/books/NBK1156

General Information from MedlinePlus

- Diagnostic Tests
  https://medlineplus.gov/diagnostictests.html
- Drug Therapy
  https://medlineplus.gov/drugtherapy.html
- Genetic Counseling
  https://medlineplus.gov/geneticcounseling.html

- Palliative Care
  https://medlineplus.gov/palliativecare.html
- Surgery and Rehabilitation
  https://medlineplus.gov/surgeryandrehabilitation.html

Additional Information & Resources

MedlinePlus

- Health Topic: Bone Diseases
  https://medlineplus.gov/bonediseases.html

Genetic and Rare Diseases Information Center

- Camurati-Engelmann disease
  https://rarediseases.info.nih.gov/diseases/1072/camurati-engelmann-disease

Additional NIH Resources

- National Institute of Arthritis and Musculoskeletal and Skin Diseases: Osteoporosis and Related Bone Diseases
  https://www.niams.nih.gov/Health_Info/Bone/

Educational Resources

- Cedars-Sinai Health System: Skeletal Dysplasia
  http://www.cedars-sinai.edu/Patients/Health-Conditions/Skeletal-Dysplasia.aspx
- Disease InfoSearch: Camurati Engelmann Disease
  http://www.diseaseinfosearch.org/Camurati+Engelmann+Disease/1039
- Disease InfoSearch: Camurati Engelmann Disease, Type 2
  http://www.diseaseinfosearch.org/Camurati+Engelmann+Disease%2C+Type+2/1040
- MalaCards: camurati-engelmann disease
  http://www.malacards.org/card/camurati_engelmann_disease
- Merck Manual Professional Version: Overview of Osteopetroses
  http://www.merckmanuals.com/professional/pediatrics/bone-disorders-in-children/overview-of-osteopetroses
- Orphanet: Camurati-Engelmann disease
  http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=1328

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD)
  https://rarediseases.org/rare-diseases/camurati-engelmann-disease/

GeneReviews

- Camurati-Engelmann Disease
  https://www.ncbi.nlm.nih.gov/books/NBK1156

ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?term=%22Camurati-Engelmann+disease%22+%5BDISEASE%5D+OR+NCT00001754+%5BID-NUMBER%5D

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Progressive+Diaphyseal+Dysplasia%5BTIAB%5D%29+OR+%28Camurati-Engelmann+disease%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

OMIM

- CAMURATI-ENGELMANN DISEASE
  http://omim.org/entry/131300
- CAMURATI-ENGELMANN DISEASE, TYPE 2
  http://omim.org/entry/606631

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